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Descripti n

The present invention relates to an elastomeric hanger structure for use in connecting a part (e.g., a portion of a vehicle exhaust system) with a supporting structure (e.g. a vehicle chassis). More specifically, the present invention relates to a new and useful elastomeric hanger structure designed to stabilize a part of an exhaust system to provide vibration isolation of the part and of the chassis, and to provide a fail-safe structure which can prevent the vehicle exhaust system from dropping onto the vehicle suspension or the ground in the event of failure of the elastomer.

Heretofore, vehicle exhaust systems have typically been hung from the underside of the vehicle's chassis by means of supporting brackets. Such brackets have generally been merely pieces of metal or rubber designed to connect the exhaust system to the vehicle without regard to force stabilization, vibration isolation, and the like.

In the prior art DE-A-3034370 (corresponding to US-A-4380324), which serves as the basis for the two-part form of the present claim 1, describes a special one-piece elastomeric support for an exhaust pipe. This has an outer loop portion with a thickened edge part with a hole for engagement of a support hook. Projecting down into the centre of the loop from the thickened part is a strip with a hole at its bottom end for engagement of a hook attached to the exhaust pipe.

The present invention relates to a new and useful elastomeric hanger structure specifically designed to provide both force stabilization and vibration isolation while connecting a part such as a vehicle exhaust system with a supporting structure such as a vehicle chassis. The hanger of the invention is also capable of being selectively tailored to control numerous static and dynamic conditions which may be encountered by the part during suspension thereof.

One important aspect of the hanger of the present invention is the manner in which the elastomeric design or configuration of the hanger provides vibration isolation and enables the hanger to be specifically configured or shaped for controlling numerous selected static and dynamic conditions.

Accordingly, in first aspect the present invention provides an elastomeric hanger for suspending a part form a support, comprising :

(i) a first elastomeric coupling portion having an opening for receiving attachment means to connect the first elastomeric coupling portion with the part ;

(ii) a second elastomeric coupling portion having an opening for receiving attachment means to connect the second elastomeric coupling portion with the support ; and

(iii) an intermediate elastomeric portion connecting the first and second elastomeric coupling portions ; at least one of said first and second elastomeric coupling portions comprising (i) an inner section having said opening, (ii) an outer section circumscribing said inner section and being spaced therefrom, characterised in that connecting webs extend from selected portions of the inner section to respective portions of the outer section so that the inner section can move relative to the outer section by deflection of the webs in response to load variation between the coupling openings.

The web means can be designed with predetermined deflection characteristics by controlling features such as the thickness of the material, the composition of the elastomeric material, the hardness (durometer) of the elastomeric material, and the like.

Another important aspect of the hanger of the present invention is the provision of a special metal reinforcing means. The metal reinforcing means is preferably embedded in the elastomeric material and is covered by the elastomeric material so that it is protected against corrosion by the elastomeric material. The metal preferably circumscribes each of the elastomeric coupling portions in the elastomer, and extends through the intermediate elastomeric portion of the hanger.

Accordingly, in a second aspect the invention provides an elastomeric hanger for use in suspending an exhaust system from a motorized vehicle chassis, and made with a one-piece elastomer moulding having a Shore A durometer hardness of from about 40 to about 75, comprising :

a first elastomeric coupling portion having an opening for receiving attachment means to connect the first coupling portion with the exhaust system or chassis, the opening defining an axial direction ;

a second elastomeric coupling portion having (i) a first section having a coupling opening formed about a central axis which is substantially parallel to said axial direction of the first elastomeric coupling portion and spaced transversely therefrom, (ii) a second section spaced radially outwardly from and circumscribing the first section, and (iii) connecting webs extending from selected portions of the first section to respective portions of the second section and being designed to deflect under the application of lateral forces to the hanger in directions substantially parallel to the axial directions of the openings, so that the first section can move relative to the second section so as to inhibit the transmission of vibration between the exhaust system and the chassis ;

an intermediate elastomeric portion connecting the first and second elastomeric coupling portions, and

metal reinforcing means comprising a length of metal wire embedded in the first coupling portion,

in the intermediate portion and in the second section of the second coupling portion, said wire at least partially enclosing each of the openings in the first and second coupling portions.

Thus, the metal provides a fail-safe backup against failure of the elastomeric material, and such a feature is especially useful in minimizing the likelihood of a vehicle exhaust system falling onto the vehicle suspension or onto the ground in the event of failure of the elastomer. Additionally, the orientation of the metal reinforcement, and the orientation of the elastomeric coupling portions of the hanger are specially designed so that the metal also provides a certain degree of lateral stability to the elastomeric hanger structure.

These and other aspects of the present invention will become apparent from the following detailed description of embodiments of the invention and from the accompanying drawings thereof.

Fig. 1 is a side view of one type of elastomeric hanger constructed according to the principles of this invention ;

Fig. 2 is a sectional view of the hanger of Fig. 1, taken on the line 2-2 ;

Fig. 3 is a sectional view of the hanger of Fig. 1, taken on the line 3-3 ;

Fig. 4 is a sectional view of the hanger of Fig. 1 taken on the line 4-4 ;

Fig. 5 is a side view of another type of elastomeric hanger constructed according to the principles of this invention ;

Fig. 6 is a sectional view of the hanger of Fig. 5, taken on the line 6-6 ;

Fig. 7 is a sectional view of the hanger of Fig. 5, taken on the line 7-7 ;

Fig. 8 is an enlarged sectional view of Fig. 5, taken on the line 8-8 ;

Fig. 9 is an enlarged sectional view of the hanger of Fig. 5, taken on the line 9-9 ;

Fig. 10 is an enlarged view of the area of the hanger of Fig. 5, labeled 10-10 ;

Fig. 11 is an enlarged sectional view of Fig. 10, taken on the line 11-11 ;

Fig. 12 is a schematic illustration of still another hanger according to the invention, shown connecting a pair of bracket parts ; and

Fig. 13 is a side view of the structure of Fig. 12, taken on the line 13-13.

The present invention relates to an elastomeric hanger structure for connecting a part such as a vehicle exhaust system with supporting structure such as the chassis of a vehicle. Figs. 1 through 4 and 5 through 11 show two different forms of elastomeric hanger structures constructed according to the concepts of the present invention, and Figs. 12 and 13 show another form of a hanger structure according to the present invention connecting two bracket members.

In Figs. 1 through 4, hanger structure 10 basically comprises a first elastomeric coupling portion 12, a second elastomeric coupling portion 14 and an intermediate elastomeric connection portion 16 connecting the first and second elastomeric coupling portions 12 and 14. A length of corrosion resistant steel wire 18 and a ring of the steel wire 19 are embedded in the elastomeric material in a manner and for purposes discussed more fully hereinafter.

In the hanger of Figs. 1 through 4, the first elastomeric coupling portion 12 comprises a body 20 of elastomeric material having central opening 22. The opening 22 is designed to receive an attachment means such as a connecting bolt for coupling the first portion 12 of the hanger with a bracket of either a vehicle chassis or a part of the vehicle's exhaust system. The second portion 14 comprises a body 30 of elastomeric material configured to define (i) an inner portion 31 with a central opening 32, (ii) an outer portion 34 surrounding the inner portion 31, (iii) a pair of webs 36 extending between the inner and outer portions 31 and 34, and (iv) a pair of openings 36A formed within the webs 36. The central opening 32 is designed to receive an attachment means such as a connecting bolt for coupling the second portion 14 of the hanger with the bracket associated with the vehicle chassis or part of the vehicle's exhaust system. The configuration of the web 36 and the openings 36A formed in the webs is designed to provide the hanger structure with predetermined deflection characteristics to enable the hanger to absorb forces and vibrations and to stabilize and/or isolate such forces or vibrations from being transmitted between the exhaust system and the vehicle chassis. The specific deflection characteristics of the hanger can be modified by altering the specific shape or form of the web 36, the openings 36A, the thickness of the elastomer, the composition of the elastomer, and the like.

The modification of the elastomeric hanger to provide for different static and dynamic conditions such as force stabilization and vibration isolation can be made in accordance with existing scientific and mechanical principles known to the art and to the literature, as for example set forth in Theory and Practice of Engineering with Rubber by Freakley and Payne, Applied Science Publishers LTD, London, England, 1978, and Elastomers : Criteria for Engineering Design by Hepburn and Reynolds, Applied Science Publishers LTD, London, England, 1979, both of which are hereby fully incorporated by reference. For example, should the elastomer hanger of Figs. 1 through 4 be required to carry a load about twice as heavy as the designed load, it can be redesigned to compensate for the additional weight by increasing the thickness of the hanger as for example in intermediate connecting portion 16, by increasing the thickness, i.e., width or depth, of steel wire 18, by changing the hardness (durometer) or composition of

the rubber, by changing the configuration of the web and/or its support angle, or combinations of the above. For pragmatic reasons, such as making as few a number of dies as possible, the easiest solution is to increase the hardness or durometer of the rubber or other elastometer. Increasing the hardness of the rubber is conventional and is well known to the art and to the literature. Hence, force stabilization and/or vibration isolation can be readily controlled by increasing the durometer hardness of the rubber. The Shore A durometer hardness of the rubber can vary widely, as from about 40 to about 75, and preferably from about 50 to about 65.

According to an aspect of the present invention, the steel wire 18 and the steel ring 19 are embedded in the elastomeric hanger. As seen in Figs. 1-4, the steel wire 18 is a single length of wire embedded in the elastomer so that the wire surrounds the central opening 22 in the first elastomeric coupling portion 12, that the wire extends through the intermediate elastomeric connecting portion 16, and that the wire extends into the outer portion 34 and circumscribes the central opening 32 in the inner portion 31 of the second elastomeric coupling portion 14. The metal ring 19 is provided in the inner portion 31, and also surrounds the central opening 32.

Wires 18 and 19 are embedded in the elastomer in such a manner that the metal wires are coated, covered, etc. by the elastomer from corrosive materials during normal operation of the hanger. Thus, the wires serve to reinforce the elastomer and in a manner that minimizes the likelihood of corrosion of the wires.

Steel wire 18 also provides a fail-safe mechanism for ensuring that the exhaust system does not drop onto the vehicle suspension or onto the ground in the event of failure of the elastomeric material. Specifically, since the wire completely surrounds both of the central openings 22 and 32 formed in the elastomeric coupling portions, it can engage the connecting bolts associated with the elastomeric coupling portions and thus retain the exhaust system attached to the chassis in the event of failure of the elastomer.

An important aspect of the metal wire of preferred embodiments of the present invention is that it not only provides a connection with good vibration isolation and/or force stability between the exhaust system and the chassis, but it also provides a connection with good lateral stability. Specifically, the central openings 22 and 32 in the elastomeric hanger extend parallel to each other, and the elastomeric web parts 36, 36A enable the hanger to deflect in order to take up strains which act parallel to the axis of openings 22 and 32. The steel wire 18 is disposed to allow the web to deflect, but minimizes the tendency of the hanger to move in the direction of the axes of central openings 22 and 32. Another important aspect is that the cantilevered portion of the metal wire which is located in intermediate elastomeric portion 16, also serves to dampen or abate lateral forces applied to the metal hanger. H nce, the metal wire as well as web means 36A provide lateral stability.

Figs. 5 through 11 disclose another embodiment of the elastomeric hanger constructed according to the concepts of the present invention. The hanger of Figs. 5 through 11 differs from the hanger of Figs. 1 through 4 primarily in that (i) the profile of its web portions 36' are different (they lack openings) ; (ii) the profile of its intermediate connecting portion 16' ; and (iii) the shape of its metal wire 18'. However, the metal wire still extends into and through the elastomer, and is shielded by the elastomer during normal operation. Additionally, the metal is disposed in such a way that it provides a fail-safe reinforcement for the elastomer in the event of failure of the elastomer.

The elastomeric hanger of the invention is preferably a molded part. As shown in Figs. 5, 8 and 11, the elastomeric portions of the hanger of Figs. 5 through 11 has locator holes 40 (Figs. 5, 8) and 42 (Figs. 5, 9, 10, 11). Those locator holes are associated with the metal wires. They result from the inclusion of locator pins in the mold, which enables the metal wires to be molded into the elastomer.

In Figs. 12 and 13, still another hanger according to the invention is shown connecting a first bracket 50 to a second bracket 52. The bracket 52 could be connected with a vehicle exhaust system, and the bracket 50 could be connected with a vehicle chassis. The elastomeric hanger is reinforced with a metal wire (not shown) and has a profile designed to allow a predetermined deflection of its web 60 in order to isolate vibrations and to provide a good lateral stability to the exhaust system.

The embodiments of Figs. 5 through 11 and 12 and 13 can also be altered in a manner as set forth above with regard to the embodiment of Figs. 1 through 4, so that the elastomeric hanger can be tailor-made to handle various static and dynamic conditions such as deflection, vibration, force stabilization, and the like. As noted above, this can be accomplished by increasing or decreasing the thicknesses of the various elastomer portions, by increasing or decreasing the thickness of the metal insert 19, by changing the configuration of the web, or preferably by increasing or decreasing the durometer hardness of the rubber.

Claims

1. An elastomeric hanger for suspending a part from a support, comprising :

(i) a first elastomeric coupling portion (12, 12', 12") having an opening (22) for receiving attachment means to connect the first elastomeric coupling portion (12, 12', 12") with the part ;

(ii) a second elastomeric coupling portion (14,

14', 14") having an p ning (32) for receiving attachment means to connect the second elastomeric coupling portion (14, 14', 14") with the support ; and

(iii) an intermediate elastomeric portion (16, 16') connecting the first and second elastomeric coupling portions ; at least one of said first and second elastomeric coupling portions (12, 14 ; 12', 14' ; 12", 14") comprising (i) an inner section (31) having said opening, (ii) an outer section (34) circumscribing said inner section and being spaced therefrom, characterised in that connecting webs (36, 60) extend from selected portions of the inner section (31) to respective portions of the outer section (34) so that the inner section (31) can move relative to the outer section (34) by deflection of the webs (36, 60) in response to load variation between the coupling openings (22, 32).

2. An elastomeric hanger according to claim 1, wherein the openings (22, 32) in the first and second elastomeric coupling portions extend parallel to each other, and the intermediate elastomeric portion (16) extends transverse to the direction of the openings.

3. An elastomeric hanger according to claim 1 or claim 2, in which there are two, three or four connecting webs (36, 60).

4. An elastomeric hanger according to any one of the preceding claims, further comprising metal reinforcement (18, 19 ; 18', 19').

5. An elastomeric hanger according to claim 4, in which the metal reinforcement is embedded in the elastomer of the hanger.

6. An elastomeric hanger according to claim 4 or claim 5, wherein the metal reinforcement reinforces the first and second elastomeric coupling portions (12, 14 ; 12', 14') and the intermediate portion (16, 16').

7. An elastomeric hanger according to claim 4, in which the metal reinforcement comprises

a first reinforcement (18, 18'), reinforcing one coupling portion (12, 12'), the intermediate portion (16, 16'), and the outer section (34) of the other coupling portion (14), and

a second reinforcement (19, 19'), reinforcing the inner section (31) of said other coupling portion (14, 14'), whereby the connecting webs (36) can deflect.

8. An elastomeric hanger according to claim 7, in which the metal reinforcements are of steel wire.

9. An elastomeric hanger for use in suspending an exhaust system from a motorized vehicle chassis, and made with a one-piece elastomer moulding having a Shore A durometer hardness of from about 40 to about 75, comprising :

a first elastomeric coupling portion (12, 12') having an pening (22) for receiving attachment means to connect the first c upling p rtion (12, 12') with the exhaust system or chassis, the opening (22) defining an axial direction ;

a second elastomeric coupling portion (14, 14') having (i) a first section (31) having a coupling pening (32) formed ab ut a central axis which is substantially parallel to said axial direction of the first elastomeric coupling portion and spaced transversely therefrom, (ii) a second section (34) spaced radially outwardly from and circumscribing the first section (31), and (iii) connecting webs (36) extending from selected portions of the first section (31) to respective portions of the second section (34) and being designed to deflect under the application of lateral forces to the hanger in directions substantially parallel to the axial directions of the openings (22, 32), so that the first section (31) can move relative to the second section (34) so as to inhibit the transmission of vibration between the exhaust system and the chassis ;

an intermediate elastomeric portion (16, 16') connecting the first and second elastomeric coupling portions (12, 14 ; 12', 14') and

metal reinforcing means (18, 18') comprising a length of metal wire embedded in the first coupling portion (12, 12'), in the intermediate portion (16, 16') and in the second section (34) of the second coupling portion (14, 14'), said wire (18, 18') at least partially enclosing each of the openings (22, 32) in the first and second coupling portions.

10. An elastomeric hanger according to claim 9, wherein said metal reinforcing means (18, 18') circumscribes each of the openings (22, 32) in said first and second elastomeric coupling portions (12, 14 ; 12', 14').

11. An elastomeric hanger according to claim 9 or claim 10, wherein said metal reinforcing means (18, 18') consists of a single length of metal wire.

Patentansprüche

1. Elastomerische Aufhängevorrichtung zum Aufhängen eines Bauteils an einer Aufhängung, umfassend :

(i) einen ersten elastomerischen Kupplungsbereich (12,12', 12") mit einer Öffnung (22) zur Aufnahme von Befestigungsmitteln zum Verbinden des ersten elastomerischen Kupplungsbereichs (12, 12', 12") mit dem Bauteil ;

(ii) einen zweiten elastomerischen Kupplungsbereich (14, 14', 14") mit einer Öffnung (32) zur Aufnahme von Befestigungsmitteln zum Verbinden d s zweiten elastomerischen Kupplungsbereichs (14, 14', 14") mit der Aufhängung ; und

(iii) einen zwischenliegenden elastomerischen Bereich (16, 16'), der den ersten und zweiten elastom rischen Kupplungsber ich verbindet ; wobei mindestens einer der besagten ersten und

zweiten elastomerischen Kupplungsbereiche (12, 14 ; 12', 14' ; 12", 14") umfaßt : (i) einen die besagte Öffnung aufweisenden inneren Abschnitt (31), (ii) einen äußeren Abschnitt (34), der den besagten inneren Abschnitt umgibt und von diesem beabstandet ist, dadurch **gekennzeichnet,** daß sich Verbindungsstege (36, 60) von ausgewählten Bereichen des inneren Abschnitts (31) zu betreffenden Bereichen des äußeren Abschnitts (34) erstrecken, so daß sich der innere Abschnitt (31) gegenüber dem äußeren Abschnitt (34) durch Auslenkung der Stege (36, 60) bei Lastschwankungen zwischen den Kupplungsöffnungen (22, 32) bewegen kann.

2. Elastomerische Aufhängevorrichtung nach Anspruch 1, wobei sich die Öffnungen (22, 32) in den ersten und zweiten elastomerischen Kupplungsbereichen parallel zueinander erstrecken und wobei sich der zwischenliegende elastomerische Bereich (16) quer zur Richtung der Öffnungen erstreckt.

3. Elastomerische Aufhängevorrichtung nach Anspruch 1 oder 2, wobei zwei, drei oder vier Verbindungsstege (36, 60) vorhanden sind.

4. Elastomerische Aufhängevorrichtung nach einem der vorhergehenden Ansprüche, ferner umfassend eine Metallverstärkung (18, 19 ; 18', 19').

5. Elastomerische Aufhängevorrichtung nach Anspruch 4, wobei die Metallverstärkung in das Elastomer der Aufhängevorrichtung eingebettet ist.

6. Elastomerische Aufhängevorrichtung nach Anspruch 4 oder 5, wobei die Metallverstärkung die ersten und zweiten elastomerischen Kupplungsbereiche (12, 14 ; 12', 14') und den zwischenliegenden Bereich (16, 16') verstärkt.

7. Elastomerische Aufhängevorrichtung nach Anspruch 4, wobei die Metallverstärkung umfaßt

eine erste Verstärkung (18, 18'), die einen Kupplungsbereich (12, 12'), den zwischenliegenden Bereich (16, 16') und den äußeren Abschnitt (34) des anderen Kupplungsbereichs (14) verstärkt, und

eine zweite Verstärkung (19, 19'), die den inneren Abschnitt (31) des anderen Kupplungsbereichs (14, 14') verstärkt, wodurch sich die Verbindungsstege (36) verbiegen können.

8. Elastomerische Aufhängevorrichtung nach Anspruch 7, wobei die Metallverstärkungen aus Stahldraht bestehen.

9. Elastomerische Aufhängevorrichtung zum Aufhängen einer Auspuffanlage am Rahmen eines Kraftfahrzeugs, die aus einem einteiligen elastomerischen Gußstück mit einer Shore-Härte von ungefähr 40 bis ungefähr 75 besteht, umfassend :

einen ersten elastomerischen Kupplungsbereich (12, 12') mit einer Öffnung (22) zur Aufnahme von Befestigungsmitteln zum Verbinden des ersten Kupplungsbereichs (12, 12') mit der Auspuffanlage oder dem Fahrgestell, wobei die Öffnung (22) eine Axialrichtung bestimmt ;

einen zweiten elastomerischen Kupplungsbereich (14, 14') mit (i) einem ersten Abschnitt (31), der eine eine zentrale Achse umgebende Kupplungsöffnung (32) aufweist, die zu der besagten Axialrichtung des ersten elastomerischen Kupplungsbereichs im wesentlichen parallel und von dieser beanstandet ist, mit (ii) einem zweiten Abschnitt (34), der im radialen Abstand außerhalb des ersten Abschnitts (31) angeordnet ist und diesen umgibt, und mit (iii) Verbindungsstegen (36), die sich von ausgewählten Bereichen des ersten Abschnitts (31) zu entsprechenden Bereichen des zweiten Abschnitts (34) erstrecken und die sich verbiegen lassen, wenn seitliche Kräfte auf die Aufhängevorrichtung im wesentlichen parallel zu den Axialrichtungen der Öffnungen (22, 32) ausgeübt werden, so daß sich der erste Abschnitt (31) relativ zu dem zweiten Abschnitt (34) bewegen kann, um die Übertragung von Schwingungen zwischen der Auspuffanlage und dem Fahrgestell zu verhindern ;

einen zwischenliegenden elastomerischen Bereich (16, 16'), der die ersten und zweiten elastomerischen Kupplungsbereiche (12, 14 ; 12', 14') verbindet ; und

Metallverstärkungsmittel (18, 18'), umfassend einen Abschnitt eines Metalldrahtes, der in den ersten Kupplungsbereich (12, 12'), den zwischenliegenden Bereich (16, 16') und in den zweiten Abschnitt (34) des zweiten Kupplungsbereichs (14, 14') eingebettet ist, wobei dieser Draht (18, 18') jede der Öffnungen (22, 32) in den ersten und zweiten Kupplungsbereichen zumindest teilweise umschließt.

10. Elastomerische Aufhängevorrichtung nach Anspruch 9, wobei die Metallverstärkungsmittel (18, 18') jede der Öffnungen (22, 32) in den ersten und zweiten elastomerischen Kupplungsbereichen (12, 14 ; 12', 14') umschließen.

11. Elastomerische Aufhängevorrichtung nach Anspruch 9 oder 10, wobei die Metallverstärkungsmittel (18, 18') aus einem einzigen Metalldrahtabschnitt bestehen.

Revendications

1. Une attache élastomérique pour suspendre une pièce à un support, comportant :

(i) une première portion d'accouplement élastomérique (12, 12, 12") ayant un orifice (22) pour recevoir des moyens de fixation afin de relier la première portion d'accouplement élastomérique (12, 12', 12") à la pièce.

(ii) une seconde portion d'accouplement élastomérique (14, 14', 14") ayant un orifice (32) pour recevoir un moyen de fixation afin de relier la

deuxième portion d'accouplement élastomérique (14, 14', 14") au support ; et

(iii) une portion élastomériqu intermédiaire (16, 16') reliant les première et seconde portions d'accouplement élastomériques ; au moins une desdites première et seconde portions élastomériques d'accouplement (12, 14 ; 12', 14' ; 12", 14") comportant (i) une section intérieure (31) ayant ledit orifice, (ii) une section extérieure (34) entourant ladite section intérieure et espacée de celle-ci, caractérisée en ce que des entretoises de liaison (36, 60) s'étendent au départ de portions sélectionnées de la section intérieure (31) vers des portions respectives de la section extérieure (34), de sorte que la section intérieure (31) puisse se déplacer par rapport à la section extérieure (34) par flexion des entretoises (36, 60) en réponse à une variation des charges entre les orifices d'accouplement (22, 32).

2. Une attache élastomérique selon la revendication 1, dans laquelle les orifices (22, 32) dans les première et seconde portions d'accouplement élastomériques s'étendent parallèlement l'un à l'autre, et la portion élastomérique intermédiaire (16) s'étend transversalement à la direction des orifices.

3. Une attache élastomérique selon la revendication 1 ou 2, dans laquelle il y a deux, trois ou quatre entretoises de liaison (36, 60).

4. Une attache élastomérique selon une quelconque des revendications précédentes, comprenant en outre un renforcement métallique (18, 19 ; 18', 19').

5. Une attache élastomérique selon la revendication 4, dans laquelle le renforcement métallique est noyé dans l'élastomère de l'attache.

6. Une attache élastomérique selon la revendication 4 ou la revendication 5, dans laquelle le renforcement métallique renforce les première et seconde portions d'accouplement élastomériques (12, 14 ; 12', 14') et la portion intermédiaire (16, 16').

7. Une attache élastomérique selon la revendication 4, dans laquelle le renforcement métallique comporte :

un premier renforcement (18, 18') renforçant une portion d'accouplement (12, 12'), la portion intermédiaire (16, 16') et la section extérieure (34) de l'autre portion d'accouplement (14, 14') et

un second renforcement (19, 19') renforçant la section intérieure (31) de ladite autre portion d'accouplement (14, 14'), permettant ainsi aux entretoises de liaison de se plier.

8. Une attache élastomérique selon la revendication 7, dans laquelle les renforcements métalliques sont en câble d'acier.

9. Une attache élastomérique devant servir à suspendre un système d'échappement au châssis d'un véhicule automobile, et faite en une pièce moulée monobloc en élastomère ayant une dureté Shore A, au duromètre, d'environ 40 à environ 75, comportant:

une première portion d'accouplement élastomérique (12, 12') ayant un orifice (22) pour recevoir des moyens de fixation en vue de relier la première portion d'accouplement (12, 12') au système d'échappement ou au châssis, l'orifice (22) définissant une direction axiale ;

une deuxième portion d'accouplement élastomérique (14, 14') ayant (i) une première section (31) ayant un orifice d'accouplement (32) pratiqué autour d'un axe central substantiellement parallèle à la dite direction axiale de la première portion d'accouplement élastomérique et espacée transversalement par rapport à celle-ci, (ii) une seconde section (34) espacée radialement vers l'extérieur de la première section (31) et entourant celle-ci, et (iii) des entretoises de liaison (36), s'étendant au départ de portions sélectionnées de la première section (31) vers des portions respectives de la seconde section (34), conçues pour plier sous l'application de forces latérales sur l'attache dans des directions substantiellement parallèles aux directions axiales des orifices (22, 32), de sorte que la première section (31) puisse se déplacer par rapport à la seconde section (34), afin d'inhiber la transmission de vibrations entre le système d'échappement et le châssis ;

une portion élastomérique intermédiaire (16, 16') reliant les première et seconde portions élastomériques d'accouplement (12, 14 ; 12', 14') et

un moyen de renforcement métallique (18, 18') comportant une portion de câble métallique noyée dans la première portion d'accouplement (12, 12'), dans la portion intermédiaire (16, 16') et dans la seconde section (34) de la seconde portion d'accouplement (14, 14'), ledit câble (18, 18') entourant au moins partiellement chacun des orifices (22, 32) dans les première et seconde portions d'accouplement.

10. Une attache élastomérique selon la revendication 9, dans laquelle ledit moyen de renforcement (18, 18') contourne chacun des orifices (22, 32) dans lesdites première et seconde portions d'accouplement élastomériques (12, 14 ; 12', 14').

11. Une attache élastomérique selon la revendication 9 ou la revendication 10, dans laquelle ledit moyen de renforcement métallique (18, 18') consiste en une seule portion de câble métallique.

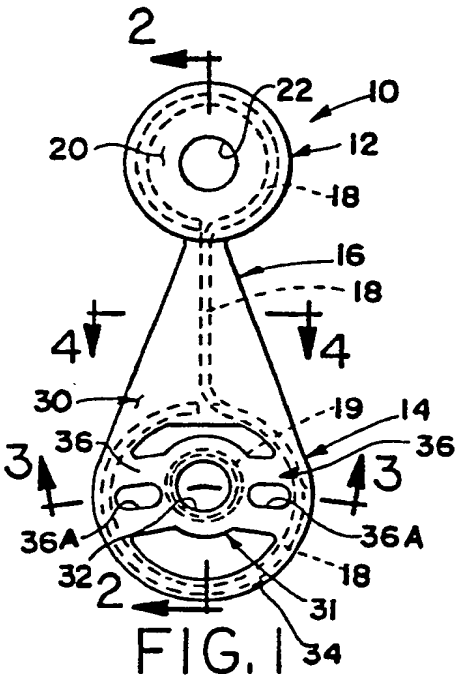

FIG. 1

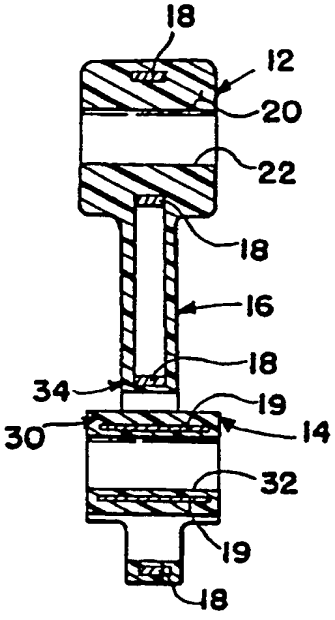

FIG. 2

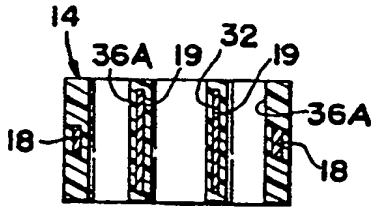

FIG. 3

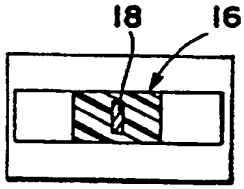

FIG. 4

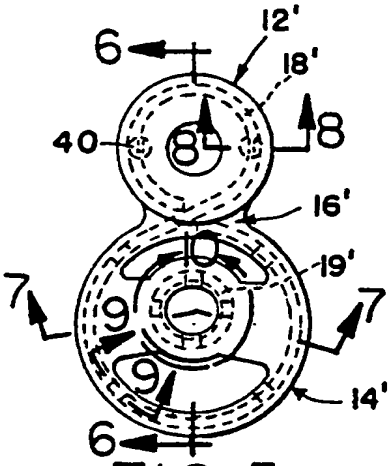

FIG. 5

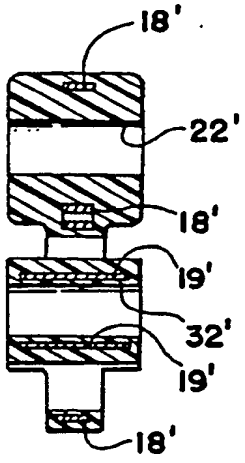

FIG. 6

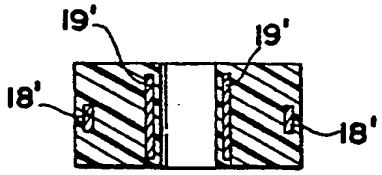

FIG. 7

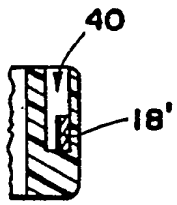

FIG. 8

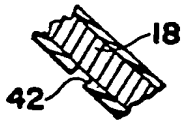

FIG. 9

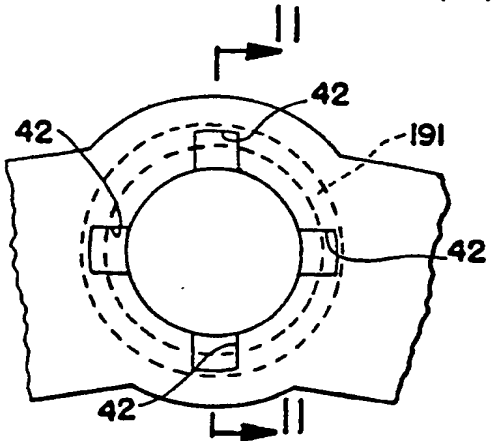

FIG. 10

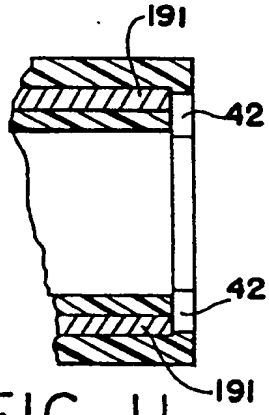

FIG. 11

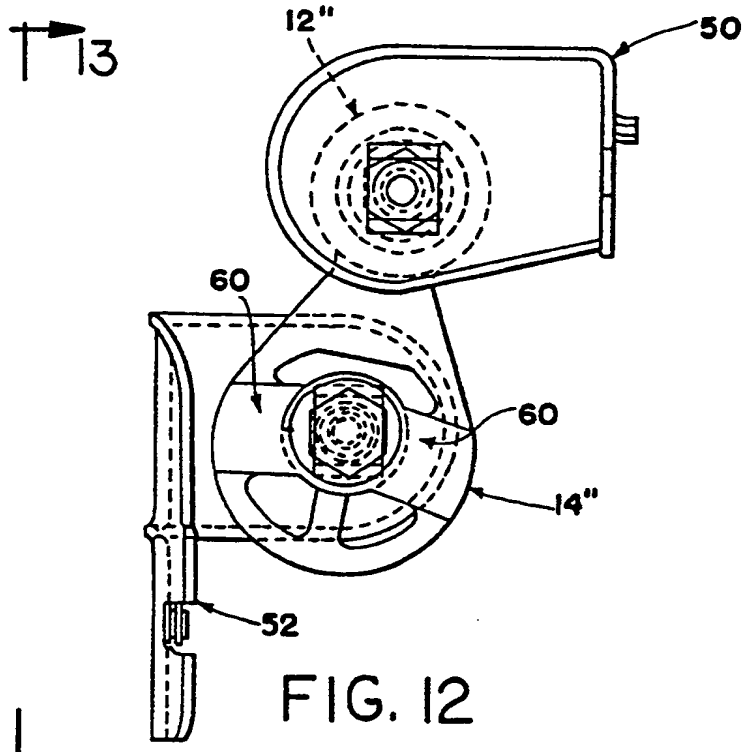

FIG. 12

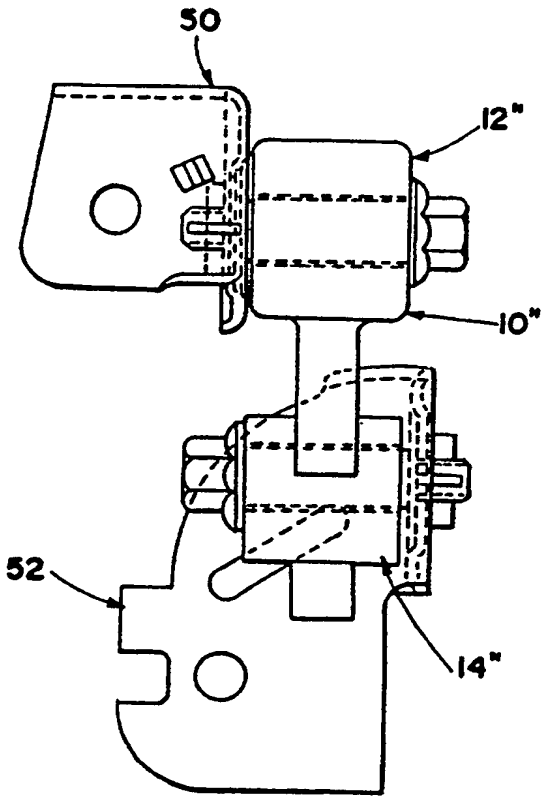

FIG. 13